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# **WHAT MAKES A GOOD COMMUNITY CITIZEN? A SOCIALIZATION MODEL FOR FREE/LIBRE/OPEN SOURCE SOFTWARE COMMUNITIES**

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## **Abstract**

*Attracting a large number of new contributors has been seen as a way to ensure the survival, long-term success, and sustainability of Free/Libre/Open Source Software (FLOSS) communities. However, this appears to be a necessary, but not a sufficient condition, as the well-being of FLOSS communities also relies on members behaving as “good citizens,” to nurture and protect the community. This research-in-progress paper outlines the examination of the socialization factors that encourage community citizenship behaviours. Drawing upon theories of socialization and citizenship behaviours from organizational behaviour research, a FLOSS-specific conceptual model is introduced. Preliminary qualitative data are used to refine and fine-tune the model to the particular context of FLOSS communities. The methodology to be used in the remainder of the study, and expected contributions, are also discussed.*

*Keywords: Free/Libre/Open Source Software, FLOSS, FLOSS communities, free software, open source, socialization, citizenship behaviours.*

## **1 Introduction**

The prominence garnered by Free/Libre/Open Source Software (FLOSS) projects across a broad range of applications is now unquestionable as it now provides a viable alternative to the conventional proprietary model of producing software (Hahn et al., 2008).

A key feature that differentiates FLOSS projects from proprietary software projects is the reliance on an active and dedicated community of talented individuals who contribute skills from a wide spectrum of software-related domains. Despite the success of the overall FLOSS movement, research has demonstrated that many FLOSS projects are characterized by high project abandonment rates (Stewart et al., 2006). Previous research has shown that such communities suffer from a lack of new developer enrolment (Hahn et al., 2008), as well as a lack of sustained participation (Fang and Neufeld, 2009). Even if a FLOSS community manages to attract large numbers of new contributors, this does not necessarily ensure its survival and sustainability. The success of FLOSS communities is arguably a result also of member “good citizenship behaviours,” which nurture and protect the community. If a community cannot encourage such behaviours, its survival may be jeopardized.

FLOSS communities have launched initiatives to attract new contributors, but also to ensure that appropriate behaviours are exhibited by new members. To date there has been no rigorous research examining the effectiveness of FLOSS socialization initiatives. This research project examines FLOSS community socialization from the contributor perspective in order to understand which socialization factors have an impact on community citizenship behaviours.

Despite a substantial body of knowledge on FLOSS community practices, FLOSS socialization research has suffered from a lack of well-grounded theoretical considerations. Furthermore, the concept of contribution within FLOSS projects has mostly been seen from a software-centric perspective, with little attention paid to other types of actions and behaviours that are crucial for the functioning of FLOSS communities (e.g., helping other members or mentoring). The organizational socialization literature contains a wealth of results and theoretical insights which could be useful in deriving a FLOSS-specific socialization model. Specifically, organizational citizenship behaviours (OCB) research appears to be a promising and insightful body of research that can lead to a broader perspective of participation and contribution when assessing a member’s performance in the context of FLOSS communities.

This research-in-progress paper proceeds as follows. First, we draw on past FLOSS research to review studies that address individual performance and contribution as well as the socialization of newcomers. Second, we describe the methodology and research plan for our ongoing study. Third, we discuss the findings of the first data collection phase and its consequences on the constructs’ conceptualization used in the research model. Finally, we present the expected theoretical contributions of the project.

## **2 Related Work**

### **2.1 Contribution and performance in FLOSS projects**

A number of FLOSS research projects have adopted a techno-centric approach by assessing member participation within a project through programming-related measures such as the number of lines of code written in a project’s source code (Roberts et al., 2006; Colazo and Fang, 2010). Several categorizations have also been described that include different types of contribution. Fang and Neufeld (2009) empirically assessed participation through the lens of legitimate peripheral participation theory, differentiating conceptual contributions (advising others) from practical contributions (improving the code). Dahlander and O’Mahony (2011) studied the phenomenon of lateral progression within FLOSS

communities, considering project interactions as technical contributions, technical communication, and coordination work.

Previous FLOSS research has highlighted the importance of helping and sharing behaviours in FLOSS communities (Wu et al., 2007; Subramanyam and Xia, 2008). Other authors have investigated FLOSS communities using a knowledge exchange and sharing perspective (Xu et al., 2009) and have thus considered the notion of contribution from a community-wide perspective. This approach seems to acknowledge the existence and relevance of certain member behaviours which, while not comprising direct software contributions, nevertheless are beneficial to the FLOSS community. There is thus a research gap to identify those extra behaviours but also to examine the factors that engender them.

## **2.2 Socialization of FLOSS newcomers**

Research addressing how individuals new to a FLOSS community are progressively socialized into the community is scarce (Ducheneaut, 2005). Past FLOSS research investigated socialization-related notions such as community joining and member specialization during the creation of a FLOSS project (von Krogh et al., 2003), the different project joining processes between volunteers and paid contributors (Herraiz et al., 2006), temporal socialization trajectories (Qureshi and Fang, 2010), and lateral authority mechanisms (Dahlander and O'Mahony, 2011). FLOSS community member integration and participation was also conceptualized as a form of legitimate peripheral participation characterized by an iterative process of situated learning (with “thinking” and “doing” activities), and identity construction through community recognition (identity-regulation) and self-perception (identity-work) (Fang and Neufeld, 2009). Criticizing the simplistic view which treats FLOSS communities as static entities rather than dynamic ones, Ducheneaut (2005) viewed socialization into a FLOSS project as a combination of an individual learning process and a political process.

Past FLOSS socialization research has been mainly exploratory, qualitative, focused on a single community, and reliant on a limited number of subjects. In addition, the overall use of archival data from FLOSS project artifacts such as code repositories and mailing lists have largely ignored the social dimension of the socialization phenomenon (such as interactions through emails, community forums, IRC channels, phone calls, or even face-to-face interactions). As a consequence, the current body of FLOSS socialization research has been limited in its comprehension of the phenomenon.

## **3 Research plan and methodology**

The study reported on here uses a mixed-method, three-phased approach in which a theoretical socialization model was first derived from the literature, and refined during a second phase involving qualitative data gathering. Phase 1 and Phase 2 will then provide the foundation for a subsequent empirical test of the resulting model (Phase 3). Phase 1 has been completed and Phase 2 is currently in progress.

### **3.1 Phase 1: Theory-Based Model Development**

**Community citizenship behaviours.** Reflecting on the behaviours which underlie innovative and spontaneous activities (Katz, 1964) introduced the notion of organizational citizenship behaviour (OCB), defined as “performance that supports the social and psychological environment in which task performance takes place” (Organ, 1997, p. 95). The most frequently operationalization of organizational citizenship was introduced by Organ (1988) who proposed five distinct dimensions that characterize the construct: altruism, conscientiousness, civic virtue, sportsmanship, and courtesy (see Table 1 for construct definitions).

**Socialization experience.** This research conceptualizes socialization using Bauer et al. (2007)’s definition. FLOSS newcomer socialization is defined as the process by which newcomers make the

transition from being community outsiders to being insiders. Van Maanen and Schein (1979) developed a model of organizational socialization which has been well supported empirically in numerous studies. Organizational socialization theory identifies six different dimensions (or tactics) that differentiate the techniques used by organizations to help newcomers get adjusted and integrated within an organization. The six dimensions are: collective, formal, sequential, fixed, serial, and investiture.

**Proximal socialization outcomes.** A bulk of research works from the organizational socialization tradition has adopted an organizational adjustment approach towards investigating the socialization of newcomers. They evaluated various adjustment outcomes that are “proximal” to the process of adjustment (e.g. role clarity, social acceptance, or social integration). The FLOSS literature along with the socialization tradition suggest three overall types of proximal adjustment outcomes: cognitive, identity-related, and interpersonal relationship factors. Perceived task mastery is defined as *a self-appraisal of one’s ability to contribute to a FLOSS project and to consistently achieve positive performance levels*. The research model encompasses two identity-related factors: social identification and perceived identity verification. The concept of social identification introduced in this research is in line with an accepted definition of social identity: *that part of an individual’s self-concept which derives from his knowledge of his membership of a social group (or groups) together with the value and emotional significance attached to that membership* (Tajfer, 1978, p. 63). Perceived identity verification is defined as the perceived confirmation from other community members of a focal person’s belief about his identities (Ma and Agarwal, 2007, p. 46). This research defines instrumental network ties as *a newcomer’s acquaintances within a FLOSS community whom he/she has known at personal level and from whom he/she can derive informational value*.

### 3.2 Phase 2 and Phase 3: Qualitative investigation of construct dimensions, instrument development/validation, online survey

The primary goal of the second phase of this research is to develop a survey questionnaire to measure the constructs in the conceptual model. It involves the use of interviews to refine the conceptualization and operationalization of the socialization experience and community citizenship behaviour constructs, the preliminary questionnaire development, a card sorting and judgment rounds procedures to improve construct validity, and a pretest using face-to-face interviews with FLOSS community members. Phase 3 will consist of a pilot study, the selection of an appropriate data collection strategy and sample size, the survey administration, and the analysis of the results.

## 4 Results from qualitative study and model refinement

Eleven community leaders, community managers, and active contributors were interviewed in order to refine the conceptualization and operationalization of the socialization experience and community citizenship behaviour constructs (see Table 1 for results). The respondents represented a range of FLOSS communities such as Ubuntu, Debian, GNOME, KDE, Gentoo, Mahara, and WordPress.

	initial definition (literature)	refined definition (qualitative study)
<b>Socialization experience dimensions</b>		
<b>formal</b>	the extent to which newcomers are segregated from other community members and put through experiences or training tailored to newcomers.	the extent to which a newcomer is segregated from other community members by taking part in a programme or initiative tailored for newcomers.
<b>collective</b>	the extent to which newcomers go through common experiences as part of a group, whereas under the individual approach, newcomers accumulate unique experiences separate from other newcomers.	the extent to which a newcomer is actively involved or actively interact with other newcomers and/or experienced members in order to learn the ropes of a project.

<b>sequential</b>	newcomers following a clear sequence of experiences or stages suggested by the community they will go through.	the extent to which a newcomer performs tasks with increasing scope and/or complexity level, or in complementary areas in order to gain a thorough understanding about a project.
<b>fixed</b>	the extent to which newcomers follow a fixed timetable about when they will move through stages.	the extent to a newcomer follows a fixed process established by a FLOSS community, to become project contributors.
<b>serial</b>	the extent to which newcomers observe and get training from experienced role models (such as mentors), who give newcomers a clear view of the experiences they will encounter in the community.	the extent to which a newcomer relies on one-to-one relationships with one or several experienced members who provide guidance, feedback and support throughout the newcomer experience.
<b>investiture</b>	the extent to which newcomers receive positive feedback confirming their prior identity.	<b>[renamed <i>supportiveness</i>]</b> the extent to which a community is perceived to be consistently supportive to a newcomer during the entire socialization phase (e.g. welcoming, providing positive feedback)
<b>Citizenship behaviours dimensions</b>		
<b>altruism</b>	voluntary actions that help another person with a work-related problem	<b>[renamed <i>interpersonal help</i>]</b> the extent to which a member voluntarily performs actions aimed at helping other community members who have expressed their need for project-related help.
<b>conscientiousness</b>	going well beyond the required levels of attendance, punctuality, housekeeping, conservation of resources, and matters of internal maintenance	the extent to which a member performs actions and carries out tasks in a dependable and reliable way by being careful, thorough, responsible, and organized (inspired from Barrick and Mount, 1991).
<b>courtesy</b>	gestures that help others avoid a problem, such as checking prior to committing to an action that will affect them (providing advance notice to people who need such information)	<b>[renamed <i>considerateness</i>]</b> the extent to which a member performs actions by always being aware of other people that could be affected and by taking into account the potential consequences of his/her actions on other community members.
<b>civic virtue</b>	responsible, constructive involvement in the political process of an organization, including expressing opinions, attending meetings, and keeping abreast of issues that involve the organization	responsible and constructive involvement in the life of a FLOSS community, including expressing opinions and taking part in decisions, attending/partaking in social events, and keeping updated about issues that involve the overall project and the areas in which the member is involved.
<b>sportsmanship</b>	a willingness on the part of employees to tolerate less than ideal circumstances without complaining and making problems seem bigger than they actually are.	<b>[dimension discarded]</b>
<b>boostering</b>	the promotion of the organizational image to outsiders (Moorman & Blakely, pg. 130)	<b>[new dimension]</b> the extent to which a member acts with the best interest for a FLOSS community and promotes its image to outsiders.
<b>behavioural compliance</b>	compliance with internalized norms defining what a “good employee ought to do” (Smith et al., 1983, pg. 657)	<b>[new dimension]</b> the extent to which a member performs actions by complying to the behavioural expectations of a FLOSS community.

Table 1. Conceptual definitions of the socialization experience and community citizenship behaviour dimensions

The conceptual definition of each socialization dimensions was refined to the FLOSS community context (2 were renamed following respondent suggestions). The interview respondents strongly confirmed the relevance of the concept of community citizenship behaviours. Four of the five citizenship behaviour dimensions were confirmed and two additional dimensions were derived from the interview findings. Aspects such as “improving image outside of the project” or “advocating a project outside” were emphasized by most respondents. Some OCB researchers such as Fahr et al. (1997) and Graham (1991) introduced the notion of organizational loyalty as an important component

of OCB. Similarly, Moorman and Blakely (1995) introduced the notion of loyal boosting, defined as “the promotion of the organizational image to outsiders”. Finally, the analysis of the interview data revealed the importance of members complying with behavioural expectations within a community.

For instance, nearly all respondents insisted on the importance of always being “nice”, “respectful”, and “friendly” when interacting with other community members. The notion of compliance is consistent with the OCB literature. Podsakoff et al. (2000) for instance, identified organizational compliance as one of the important factors of OCB. The research model is presented in Figure 1.

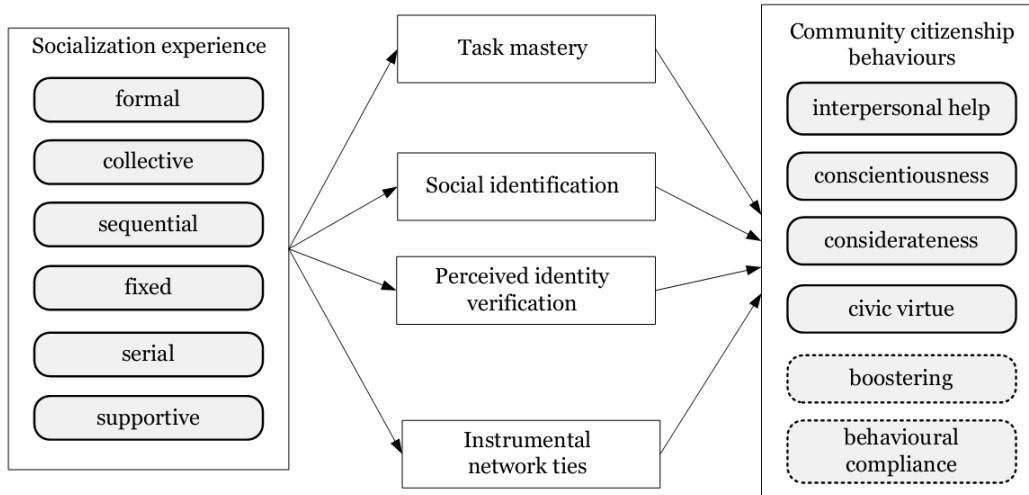


Figure 1. Proposed research model (novel dimensions dashed)

## 5 Expected contributions and conclusion

This research project brings a well-established theoretical foundation to an investigation of FLOSS community practices, something that has been largely absent in prior research. It also addresses the overall lack of quantitative studies and lack of use of primary data in FLOSS research.

From the practitioner perspective, this research project addresses two important issues faced by FLOSS communities. First, it will help FLOSS communities in understanding the factors that contribute to the successful socialization of new members. It will thus help communities to tailor proper socialization initiatives that lead to behaviours that match community values, and increase the community’s sustainability. As well, this study will also help FLOSS communities to better understand the mechanisms that influence members’ behaviours. In addition, a broader understanding of participation through the introduction of the notion of citizenship behaviours will also benefit communities in helping them to understand in greater detail how individuals contribute. This research will also benefit FLOSS participants themselves by providing them with suggestions for practices which will help them engage with a new FLOSS community.

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